Chem 2 Midterm Review Questions:

1. For the following data set (6.1, 7.2, 6.5, 4.9, 5.3, 5.9) find the mean (average), the standard deviation estimate, the confidence interval for a single value at 90% and the confidence interval for the mean at 90% where t = 2.015.

2. For a cylinder plated in chromium, determine the thickness of the coating. The density of chromium is 7.19 g/cm^3. The initial mass was 7.797 g. After the removal of the chromium coating, the final mass was 5.640 g. The height was 13 cm and the diameter was 6 cm. The equation for the surface area of a cylinder is $SA_{cylinder} = 2(\pi r^2) + 2\pi rh$. Find the volume of the coating, the surface area of the coating, and the thickness of the coating.

3. The initial mass of magnesium is 0.706 g. The magnesium is heated in a crucible where the weight of the crucible and its contents are found to be 15.562g after a combustion reaction occurs the final weight of the new magnesium oxide compound is16.732g. Find the mass of the initial magnesium. Find the mass of the oxygen in the new compound. Find the mass percent of each. Find the formula weights for MgO, MgO$_2$ and Mg$_2$O and the mass percent of Mg and O in each compound.

4. A mixture is known to contain three of the four compounds in the table. After the mixture of the three solids was extracted with hot water and filtered, Compound A was obtained by evaporating the filtrate to dryness. When 3M HCl was added to the solid residue, a clear solution resulted. After adding excess 3M NaOH solution to the acid solution, a precipitate formed. After filtration, the insoluble solid was found to be Compound B. Compound C was recovered by evaporation of the filtrate. Neither Compound A, B, nor C was soluble in all of the solvents, that is water, 3 M HCl, and 3M NaOH. Identify Compounds A, B, and C. Briefly explain your answer.

	Cold water	Hot water	3M HCl	3M NaOH
benzoic acid	no	yes	no	yes
Mg(OH)$_2$	no	no	yes	no
Na$_2$SO$_4$	yes	yes	yes	yes
Zn(OH)$_2$	no	no	yes	yes

5. You are given 1.12 M HCl and 1.56 M NaOH. The antacid you use contains 300 mg of CaCO3 and 100 mg of Al(OH)3. If the antacid dissolved in 35.0 ml of HCl and was then back titrated with 15.6 ml of NaOH., find the following: the mmoles of HCl used to dissolve the antacid; the mmoles of NaOH used to backtitrate; the mmoles of antacid used to neutralize the antacid. Write the balanced equations. Find the mmoles of each component and the theoretical number of mmoles of HCl that should have been needed to neutralize the antacid.